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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/857,258	09/14/2001	Isao Nakatani	20010701A	3393

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WASHINGTON, DC 20006-1021

EXAMINER
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VINH, LAN

ART UNIT	PAPER NUMBER
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1765

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DATE MAILED: 06/19/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/857,258

Applicant(s)

NAKATANI, ISAO

Examiner

Lan Vinh

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 04 April 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 5-8 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 5-8 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☒ Certified copies of the priority documents have been received in Application No. 09/857,258.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_ 6) ☐ Other:

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 5 is rejected under 35 U.S.C. 102(b) as being anticipated by Douglas (US 5,431,774).

Douglas discloses a dry etching method for metal such as copper in an energetic environment such as plasma using an etching gas containing hydrogen such as HCl and nitric oxide (NO) (col 8, lines 1-21; abstract ), which reads on etching a metallic surface of copper by plasma of an etching gas containing nitrogen oxide and a hydrogen-containing compound while being reacted with the plasma.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 6 is rejected under 35 U.S.C 103(a) as being unpatentable over Douglas (US 5,431,774) in view of Naem et al (US 5,846,884)

Douglas's method has been described above in paragraph 2. Douglas differs from the instant claimed invention as per claim 6 by using HCl as hydrogen-containing

compound instead of an hydrocarbon.

However, Naem, in a method of metal etching, teaches using HCl or CH<sub>4</sub>/hydrocarbon in RIE of copper layer (col 2, lines 28-30)

Hence, one skilled in the art would have found it obvious to modify Douglas method by substituting Douglas HCl with hydrocarbon in view of Naem teaching because Naem discloses that chemical such as HCl or CH<sub>4</sub> are useful in RIE of layer stack containing a copper layer 106 (col 2, lines 27-29 )

5. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Douglas (US 5,431,774) in view of Fraser et al (US 3,975,252)

Douglas's method has been described above in paragraph 2. Unlike the instant claimed inventions as per claim 7, Douglas fails to disclose the step of using a mask material of titanium to cover the metallic surface on etching.

However, Fraser discloses a etching method comprises the step of forming a titanium mask layer to cover metallic portion/surface during/on sputtering etching using gaseous etchant (col 5, lines 10-22)

Since both Douglas and Fraser are concerned with method of etching metallic surface using gaseous etchant, one skilled in the art would have found it obvious to modify Douglas's method by adding the step of forming a titanium mask layer to cover metallic portion/surface during/on etching as per Fraser because according to Fraser, the titanium mask protects the underlying metallic surface during the sputtering etching/gaseous etching (col 5, lines 20-23)

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6. Claim 8 is rejected under 35 U.S.C 103(a) as being unpatentable over Douglas (US 5,431,774) in view of Naem et al (US 5,846,884) and further in view of Fraser et al (US 3,975,252)

Douglas as modified by Naem has been described above in paragraph 4. Unlike the instant claimed inventions as per claim 8, Douglas and Naem fail to disclose the step of using a mask material of titanium to cover the metallic surface on etching.

However, Fraser discloses a etching method comprises the step of forming a titanium mask layer to cover metallic portion/surface during/on sputtering etching using gaseous etchant (col 5, lines 10-22)

Since Douglas, Naem and Fraser are concerned with method of etching metallic surface using gaseous etchant, one skilled in the art would have found it obvious to modify Douglas and Naem method by adding the step of forming a titanium mask layer to cover metallic portion/surface during/on etching as per Fraser because according to Fraser, the titanium mask protects the underlying metallic surface during the sputtering etching/gaseous etching (col 5, lines 20-23)

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 5-8 have been considered but are moot in view of the new ground(s) of rejection.

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

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§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

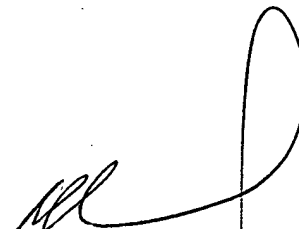
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

***Conclusion***

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lan Vinh whose telephone number is 703 305-6302. The examiner can normally be reached on M-F 8:30-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Benjamin Utech can be reached on 703 308-3836. The fax phone numbers for the organization where this application or proceeding is assigned are 703 872-9310 for regular communications and 703 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308-0661.



ROBERT KUNEMUND  
PRIMARY EXAMINER

LV  
June 8, 2003